

REMARKS

This submission accompanies a Request for Continued Examination, and is in reply to the Advisory Action mailed on June 27, 2008, and the Final Office Action mailed on February 25, 2008. Applicants respectfully request reconsideration of the present application in view of the reasons that follow.

Claims 1 and 5-36, and 38-76 are currently pending, with claim 37 withdrawn from consideration. Claims 1, 60, 61, 66, and 69 have been amended. Applicants submit that the amendments are fully supported by the specification as originally filed including, but not limited to the claims as originally filed and the examples provided. No new matter has been added by way of amendment. Applicants expressly reserve the right to pursue any of the amended claims, in a timely filed continuation or divisional application.

I. Claim Rejections Under 35 U.S.C. § 102.

Claims 1, 5-8, 12-19, 21-23, 25, 26, 28-38, 45-53, and 56-60 stand rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,120,839 issued to Emmons *et al.* Applicants respectfully traverse this rejection.

Claim 1 recites:

An oligomer-modified anionically polymerized polymer comprising the reaction product of:

- (a) a free-radically polymerized oligomer **consisting of the reaction product of** one or more monomers selected from the group consisting of vinyl aromatic monomers and ester functional monomers and one or more monomers selected from the group consisting of epoxy functional monomers, anhydride functional monomers, ester functional monomers and carboxylic acid functional monomers, the oligomer having a number average molecular weight of about 1000 to about 5000 g/mol and a weight average molecular weight of about 1500 to about 18,000 g/mol; a number average number of functional groups from about 4 to about 12; and a polydispersity index of about 1.5 to about 4.5 and
- (b) an anionically polymerized polymer;

wherein the number average number of functional groups is calculated based upon functional groups selected from the group consisting of epoxy functional groups, anhydride functional groups, and carboxylic acid functional groups.

Emphasis added. Thus, the instantly claimed polymers comprise a free-radically polymerized oligomer, and an anionically polymerized polymer. While the claimed oligomer-modified anionically polymerized polymer may have other additives, any free-radically polymerized oligomer to be used in the polymer must consist of the listed monomer compounds.

In the Advisory Action, the Examiner had requested that the language reciting “obtained from the reaction” be deleted. However, that would have resulted in the recitation of “...the oligomer comprising one or more monomers...” As oligomers are the reaction product of monomers, Applicants believe the recitation that the oligomer consists of the reaction product of the recited monomers is more descriptive of the presently claimed invention.

The Examiner has contended that Emmons teaches free radically produced acrylates. However, as shown in previous responses, and as discussed in the Examiner interview of June 2, 2008, the free-radically produced acrylates of Emmons undergo aminolysis before reaction with any other polymers. It is the aminolysis products that the Examiner, in directing Applicants attention to Example 24 of Emmons, contends anticipated the previously presented claims when reacted with an anionically polymerized polymer. While Applicants disagree with this contention, for the purpose of furthering the prosecution of the application, claim 1 has been amended to clearly set forth the components of any free-radically polymerized oligomer to be used in the presently claimed oligomer-modified anionically polymerized polymers.

Thus, the presently claimed invention clearly excludes the aminolysis polymers of Emmons. None of the recited monomers has amine functionality, and no aminolysis steps are included. Where a free-radically polymerized oligomer is used in the preparation of the oligomer-modified anionically polymerized polymers, the oligomer consists of the listed monomers, which do not include amines or aminolysis products.

Applicants submit that the presently claimed compositions are novel over the Emmons reference. Because Emmons fails to teach each and every element of the claims as currently presented, Emmons cannot be found to anticipate any of the independent claims currently pending, and by definition all of the claims depending therefrom. Applicants respectfully request removal of the rejections under 35 U.S.C. § 102.

II. Claim Rejections Under 35 U.S.C. § 103.

Gottschalk in view of McCormick, Klier, or Emmons

Claims 61-63, 66-74, and 76 stand rejected under 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 5,998,554, issued to Gottschalk, *et al.*, in view of U.S. Patent Publication No. 2006/0111532, applied for by McCormick *et al.*, or U.S. Patent No. 6,143,820, issued to Klier, or Emmons. Applicants respectfully traverse this rejection.

Gottschalk

The Examiner admits that there “are no examples in Gottschalk of B components with applicants weight average molecular weights and number average molecular weights.” Office Action, page 3. Applicants agree and take this one step further: there are no examples in Gottschalk of polymers comprising the oligomers consisting of the recited monomers of the presently claimed invention.

Claim 61 recites:

A reinforced material comprising a compound that is one of asphalt, plastics and rubbers and the reaction product of (a) a free-radically polymerized oligomer *consisting of the reaction product of* one or more monomers selected from the group consisting of vinyl aromatic monomers and ester functional monomers and one or more monomers selected from the group consisting of epoxy functional monomers, anhydride functional monomers, ester functional monomers and carboxylic acid functional monomers, the oligomer having a number average molecular weight of about 500 to about 10,000 g/mol and a weight average molecular weight of about 1000 to about 60,000 g/mol; and is made in a reactor using a continuous polymerization process at a polymerization temperature of from about 180 degree C to about 350 degree C with a residence time in the

reactor of less than about 60 minutes; and (b) an anionically polymerized polymer.

Emphasis added. Applicants point out that the claim has been amended to recite that the free-radically polymerized oligomer *consists of the* reaction product of the recited monomeric compounds, per the Examiner's suggestion in the Advisory Action. Additionally, as acknowledged in principle by the Examiner, despite the "comprising" transitional phrase as it refers to the reinforced material, free-radically polymerized oligomers are narrowly defined within the claim. Therefore, the comprising language cannot be interpreted to include other free-radically polymerized oligomers having other functionalities.

All of the Gottschalk polymers are based upon vinyl aromatic and *acrylonitrile* monomers. As will be recognized, acrylonitrile is not one of the monomers recited in either of the Markush listings. Gottschalk specifically requires the presence of **both** a vinyl aromatic (50 to 99.9%) and either acrylonitrile, methacrylonitrile, or a mixture thereof (0.1 to 50%). Col. 3, lines 36-43. In fact, Gottschalk emphasizes that the "main components are styrene and acrylonitrile." Col. 4, lines 6-7.

Therefore, Gottschalk fails on two fronts with regard to the presently claimed oligomer—(1) the weight and number average molecular weight ranges and (2) the monomeric makeup of the oligomers. Likewise, McCormick, Klier, and Emmons fail to remedy the situation. Emmons' failings are described above with regard to the rejection under 35 USC § 102.

McCormick

McCormick is directed to "[p]olymers and copolymers synthesized by means that yield a narrow range of molecular weights [and that] can have different properties than polymers synthesized by conventional means. In order to obtain such polymers, however, polymerization must be controlled." Abstract. To do this, McCormick focuses on the use of a "reversible addition-fragmentation chain transfer (RAFT) procedure with dithioesters or trithioesters as

chain transfer agents (CTA's)." Paragraph 23. McCormick notes that such "dithioester and trithioester chain transfer agents of the present invention are particularly advantageous [because] [t]hey can be used to produce polymers with low polydispersities." *Id.* McCormick requires the dithioesters and trithioester and McCormick does not disclose materials that meet each and every element of the oligomers described in Claim 1. Hence, as with Gottschalk, McCormick fails to teach the oligomers of the present claims.

Klier

The Examiner relies upon Klier for a teaching of polydispersities of free-radically polymerized, water-soluble polymeric compositions. Office Action, page 3. The materials of Klier are specifically for use in "detergent formulations..., dispersants, sequestration agents, antiscalants..., and as dispersants..." Col. 1, lines 7-13. The claims to which Klier is applied, claims 61, 66, and 69, are all directed to polymers that are for use in asphalt, plastics, and rubbers, as, for example, reinforcing agents. Such polymers have different properties and will not be co-extensive with the water-soluble Klier materials which are useful in solution. Thus, the Examiner's reliance upon Klier for a teaching of polydispersity is misplaced with regard to a materials that are used in solution versus those that are found in asphalt, plastics, and rubbers, as is presently claimed. Furthermore, the polymers of Klier fail to teach or suggest "[a] reinforced material comprising ... the reaction product of (a) a free-radically polymerized oligomer *consisting of the reaction product of* one or more monomers selected from the group consisting of...and one or more monomers selected from the group consisting... and (b) an anionically polymerized polymer. Thus, Klier also fails to teach the oligomers of the the presently claimed polymeric compounds.

Emmons

As shown above with regard to the anticipation rejections, Emmons fails to teach the presently claimed polymers. Furthermore, Applicants submit that Emmons fails to suggest or give reason to one of skill in the art to prepare the presently claimed polymers. Emmons is

concerned with the use of “the aminolysis of a group of oligomeric polymers having aminolyzable acrylate or methacrylates groups.” Col. 1, lines 10-13. All of the Emmons oligomers are aminolyzed prior to further reaction, or are used as prepared. There is no suggestion that intermediate products, prior to aminolysis, could be used in further reactions with other polymers, in particular anionically polymerized polymers. Thus, Emmons too fails to teach or suggest the particularly claimed oligomers of the presently claimed invention.

The fact remains, to establish a *prima facie* case of obviousness, the Examiner must provide reasons to combine or modify the references to teach each and every limitation of the claimed invention. Applicants submit that in the present case, each of the references, individually fails to teach, suggest, or provide any reasons to those of skill in the art to provide for the claimed oligomeric components. As each references fails individually to teach the same element, the combination, likewise, must fail. Applicants request that the Examiner reconsider and remove the noted rejections.

Brandstetter and Lai, or Greenblatt

Claims 1, 5-63, and 66-76 stand rejected under 35 U.S.C. § 103(a) as being obvious over German Patent No. DE 3150171, issued to Brandstetter *et al.*, in view of U.S. Patent Publication No. 2003/0187138, applied for by Lai, or U.S. Patent Publication No. 2003/0069363, applied for by Greenblatt. Applicants respectfully traverse this rejection.

Brandstetter

As above, the cited references fail to teach or suggest each and every element of the claims as pending. As with claim 61, the invention as defined by claim 1, distinguishes the cited art by reciting “...(a) a free-radically polymerized oligomer *consisting of* one or more monomers selected from the group consisting of vinyl aromatic monomers and ester functional monomers and one or more monomers selected from the group consisting of epoxy functional monomers, anhydride functional monomers, ester functional monomers and carboxylic acid functional monomers...” Emphasis added. Thus, where a free-radically polymerized oligomer is

used in the claimed oligomer-modified anionically polymerized polymers, it must be a free-radically polymerized oligomer consisting of the listed monomeric components. Applicants submit that alone or in combination, Brandstetter, Lai, and Greenblatt fail to establish a *prima facie* case of obviousness with regard to the pending claims.

Brandstetter is directed to the preparation of block co-polymers based upon ethylene co-polymers that contain any of a number of functional groups. Page 3 of the translation. The ethylene co-polymers are then reacted with living polymer anions. Page 5 of the translation. Brandstetter teaches that the “ethylene copolymers have the general formula: $[(A_n)_i(B_l)_k]$, whereby A = -CH₂-CH₂-, B is the co-monomer polymerized in with one of the above-described functional groups...” Page 6 of the translation. Such ethylene co-polymers may be produced by radical decomposed polymerization, which Applicants believe to be a poor translation for a free-radical polymerization. *Id.*

In so describing the identity of the ethylene copolymers, Brandstetter fails to teach or suggest a free-radically polymerized oligomer obtained by reaction of the recited monomers. The claimed oligomers require the free-radically polymerized oligomer to *consist of* one or more monomers selected from the group consisting of vinyl aromatic monomers and ester functional monomers and one or more monomers selected from the group consisting of epoxy functional monomers, anhydride functional monomers, ester functional monomers and carboxylic acid functional monomers...” The Brandstetter materials require ethylene copolymerization with other monomers. Co-polymerization of ethylene with other monomers is not encompassed by the presently pending claims with regard to the free-radically polymerized oligomer.

Because Brandstetter fails to teach or suggest the claimed free-radically polymerized oligomers, Lai and/or Greenblatt must be relied upon to teach at least this element. They do not.

Lai

Lai, is directed to “s,s’-bis-(α,α' -disubstituted- α'' -acetic acid)-trithiocarbonates and derivatives thereof, as well as a process for making the same.” Paragraph 2. “Such compounds can be reacted with monomers to form acrylate repeat units within the compound [and subsequently], functional end groups can be added thereto such as epoxy, vinyl, or hydroxyl groups.” *Id.* The Examiner relies upon Lai for a discussion of the polydispersities that may be achieved using the described trithiocarbonate materials. Office Action, pages 4-5. Lai does not teach, suggest, or exemplify the free-radically polymerized oligomers as found in the presently presented claims.

Greenblatt

Greenblatt is directed to the preparation of oligomers with a low degree of polymerization, without the need for the use of excessive amounts of initiators. Paragraph 13. Again, the Examiner relies upon Greenblatt solely for support related to polydispersity ranges. Office Action, pages 4-5. However, Greenblatt does not disclose polymers having the stated elements, at least with regard to the claimed free-radically polymerized oligomer. Without more, Greenblatt does not fill the deficiencies of Brandstetter.

Applicants submit that Brandstetter in view of Lai or Greenblatt fails to provide the requisite modifications to establish a *prima facie* case of obviousness, and request that the Examiner reconsider and remove the noted rejections.

III. Rejoinder

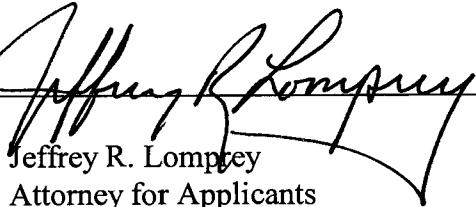
In the Office Action of 1/20/2006, claim 37 was indicated as withdrawn as a non-elected species. 37 C.F.R. § 1.141 provides for rejoinder of non-elected species in an application where a generic claim is found allowable. Applicants submit that claim 1, which is generic to claim 37, is now allowable. As such, Applicants respectfully request that the Examiner rejoin claim 37 pursuant to Rule 141.

CONCLUSION

Applicants believe that the present application is now in condition for allowance, and request that the Examiner remove all rejections, allowing the application to move forward to issuance. Favorable reconsideration of the application as amended is respectfully requested. The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

Respectfully submitted,

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